

DOCKET NO.: 278481US0PCT



IFN

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:

Hiroynki KURIMURA, et al.

SERIAL NO: 10/549,572

GROUP: 1711

FILED: September 19, 2005

EXAMINER:

FOR: BLOCK COPOLYMER MIXTURE CONTAINING STAR-BRANCHED
BLOCK COPOLYMER

LETTER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith is a Singaporean Written Opinion for the Examiner's consideration.
The reference(s) cited therein have been previously filed on **December 16, 2005 and May 10, 2007.**

Respectfully Submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Harris A. Pitlick

Registration No. 38,779

Customer Number

22850

Tel. (703) 413-3000
Fax. (703) 413-2220
(OSMMN 03/06)

Paul J. Killos
Registration No. 58,014

RF 240

In Reply Please Quote Our Reference

Your Ref : MJ/JOL/AA/PAT/8122288/SG
Our Ref : 2005060165/070801/TMMHO/9590
Date : 01/08/2007
Writer's Direct Line : 63302748

DREW & NAPIER LLC
P.O. BOX 152 ROBINSON ROAD
SINGAPORE 900302

Dear Sir,

Singapore Patent Application No.: 200506016-5

Title of invention: **BLOCK COPOLYMER MIXTURE CONTAINING STAR-BRANCHED BLOCK COPOLYMER**

Applicant(s): **DENKI KAGAKU KOGYO KABUSHIKI KAISHA (JP)**

INVITATION TO RESPOND TO WRITTEN OPINION

We forward with this letter a copy of the Written Opinion drawn up by the Examiner in connection with your request for an Examination Report.

You are invited to respond to the opinion by submitting:

- (a) Written submissions or arguments disagreeing with the Examiner's opinion and/or
- (b) An amendment of the specification of the application.

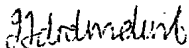
If you intend to respond, the response must be filed within 5 months from the date of this letter. You are also advised to inform us early if you do not intend to respond.

The Examiner will proceed to establish the Examination Report if no response is received by the end of the prescribed period.

If you have any further queries, please do not hesitate to contact the undersigned.

Thank you.

Yours faithfully,



Muhammad Haramain Osman
for REGISTRAR OF PATENTS
SINGAPORE



Austrian Patent Office
Service and Information Center
(TRF)

Dresdner Straße 87
A - 1200 Wien VIENNA
Austria

Tel.No.: ++431/53424/0
Fax.No.: ++431/53424/520

To

**INTELLECTUAL PROPERTY OFFICE
OF SINGAPORE**

51 Bras Basah Road #04-01
Plaza By The Park

SINGAPORE 189554

Date of mailing:

Applicant
DENKI KAGAKU KOGYO KABUSHIKI KAISHA

Application No.
200506016-5

Filing Date
19 March 2004 (19.03.2004)

(Earliest) Priority Date
19 March 2003 (19.03.2003)

International Patent Classification (IPC⁸)
C08F 297/04 (2006.01); C08F 8/00 (2006.01), C08L 53/02 (2006.01)

Please find enclosed the

- ☐ **SEARCH REPORT**
- ☐ **EXAMINATION REPORT**
- ☒ **WRITTEN OPINION**

provided by the Austrian Patent Office as Search and Examination Authority according to the Memorandum of Understanding between the Government of Singapore and the Austrian Patent Office (MOU)

Best regards

AUSTRIAN PATENT OFFICE
Service and Information
Center TRF

Dr. Koller

Enclosures:

- ☐ the search report
(it is also accompanied by a copy of each prior art document cited in the report)
- ☐ the examination report
- ☒ the written opinion
- ☐ the Registry's copy of the priority application



Austrian Patent Office

Application No. 200506016-5	Applicant: DENKI KAGAKU KOGYO KABUSHIKI KAISHA
Filing date 19 March 2004 (19.03.2004)	(Earliest) Priority Date 19 March 2003 (19.03.2003)

GENERAL OBSERVATIONS

☒ Unity of invention is given.

Consequently, all parts of the application were the subject of examination in establishing this report.

☒ Basis of the opinion:

The written opinion has been drawn on the basis of the application as transmitted with the request; and in consideration of the search report prepared by the Japanese Patent Office/ISA, dated 01.06.2004.

☒ The Applicant is thereby INVITED TO REPLY to this opinion within **5** months from the date of the Registrar's letter enclosing the written opinion.

HOW? By submitting a written reply, accompanied where appropriate, by the amendments.

IF NO REPLY IS TRANSMITTED, the examination report will be established on the basis of this written opinion.

The Applicant's attention is drawn to the fact that a later submission will be considered not to have been made and will therefore not be taken into account.

AUSTRIAN PATENT OFFICE
Dresdner Straße 87, A-1200 VIENNA
Facsimile No. ++431/53424/535

Authorized Officer
Maria Petz-Stifter

Telephone No. ++431/53424



☐ EXAMINATION REPORT
☒ WRITTEN OPINION

Application No.
200506016-5

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Date of actual completion of the report / opinion: 18 May 2007 (18.05.2007)

1. STATEMENT

Novelty (N)	YES	Claims	----
	NO	Claims	1-13
Inventive step (IS)	YES	Claims	----
	NO	Claims	1-13
Industrial applicability (IA)	YES	Claims	1-13
	NO	Claims	----

2. CITATIONS AND EXPLANATIONS

The following documents not cited (D1) and cited (D2-D6) in the search report are considered for the purpose of this report.

D1: EP 0646607 A2 - Filed May 10, 2007
D2: JP 2000-026698 A
D3: JP 07-228647 A
D4: JP 64-081844 A
D5: JP 03-026747 A
D6: JP 08-231659 A

Filed Dec 16, 2005

The present application relates to a block copolymer mixture containing a novel branched block copolymer comprising a conjugated diene and a vinyl aromatic hydrocarbon compound. This branched block copolymer excellent in transparency and impact resistance and useful as a block copolymer mixture by itself or as blended with another thermoplastic resin.

According to claim 1, a block copolymer mixture containing a branched block copolymer as the main component is claimed, in that the block copolymer mixture comprises from 55 to 95 mass% of a vinyl aromatic hydrocarbon and from 5 to 45 mass% of a conjugated diene as monomer units, a linear block copolymer prior to coupling is formed by coupling living active site represented by the formulae: S1-B-Li, S2-B-Li, S3-B-Li (wherein each of S1, S2 and S3 is a polymer block comprising a vinyl aromatic hydrocarbon as monomer units, B is a polymer block comprising a conjugated diene as monomer units, and Li is a living active site comprising lithium, and the number average molecular weights are $S1 > S2 > S3$), and further, (1) molecular weight distribution (M_w/M_n) of a mixture of the polymer blocks S1, S2 and S3 each comprising a vinyl aromatic hydrocarbon as monomer units is within a range of from 3.25 to 6, and (2) in a gel permeation chromatogram of the mixture of the polymer blocks S1, S2 and S3, $M1/M3$ is within a range of from 13 to 25, and $M2/M3$ is within a range of from 2 to 4, where $M1$, $M2$ and $M3$ are peak top molecular weights of components corresponding to S1, S2 and S3. The block copolymer formed by coupling using an epoxidized oil preferably epoxidized soybean oil.

In the independent claim 12 a thermoplastic resin composition comprising the block copolymer mixture and a thermoplastic resin other than the block copolymer mixture is claimed. Preferably, a thermoplastic resin is a styrene resin.

In document D1) a method for preparing resinous polymodal monovinylarene-conjugated diene block copolymers and polymers produced thereby are provided. The method comprises sequentially contacting under polymerization conditions: (a) a monovinylarene monomer and initiator; (b) initiator and a monovinylarene monomer; (c) a sequence of at least two charges selected from the group consisting of (i) initiator and a monovinylarene monomer, (ii) a mixture of monovinylarene monomer and conjugated diene monomer, (iii) a conjugated diene monomer, (iv) a monovinylarene monomer; (d) a coupling agent; wherein the sequence of at least two charges in step (c) can be made in any order. In a preferred embodiment, at least three initiator charges are provided. In another preferred embodiment, at least three monovinylarene charges precede the first charge containing conjugated diene. In another preferred embodiment, at least four monovinylarene charges precede the first charge containing conjugated diene.

In document D2) a block copolymer composition containing 50-95 wt.% block copolymer comprising a vinyl aromatic hydrocarbon and a conjugated diene, and 5-50 wt.% at least one polymer selected from a vinyl aromatic hydrocarbon and its manufacture is described.

In document D3) a production of block copolymer is described which is useful in food products. In hydrocarbon solvent a conjugated diene and a vinyl aromatic hydrocarbon as one of monomers for block copolymerization and an organolithium compound as an inhibitor are fed.

The invention of document D4) relates to a block copolymer composition outstanding in blocking resistance, giving high performance adhesive mass when incorporated with tackifier etc., by blending three kinds of aromatic vinyl-conjugated diene block copolymer each prepared by coupling with specific coupling agent.

D5) describes a block copolymer composition for tacky adhesive and tacky adhesive composition having excellent initial bond strength, maintenance of adhesivity and discoloration stability with elapse of time and suitable as an adhesive by compounding a specific tribranched block copolymer, a dibranched block copolymer and a linear diblock copolymer at specific ratios.

In document D6) process for manufacturing multiarmed assymetrical radial block copolymer is described having a combination of arms with a relatively narrow molecular weight distribution and arms with a rather broad molecular weight distribution by employing a specific process.

Novelty/ Inventive step

The process of D1) can be carried out using as an initiator any of the organomonoalkali metal compounds of the formula RM wherein R is an alkyl, cycloalkyl or arylcarbanion containing 4 to 8 carbon atoms and M is an alkyl metal cation. The preferred initiators are alkylmonolithium compounds, especially n-butyllithium or sec-butyllithium. The conjugated diene monomers which can be used contain 4 to 6 carbon atoms. The preferred conjugated diene monomer is 1,3-butadiene. The monovinylarene monomers, which can be used contain 8 to 12 carbon atoms and include styrene. Examples of polar compounds, which can be advantageously employed as randomizers and promoters are ethers, sulfides and tertiary amines. Useful coupling agent is epoxidized vegetable oil, preferred is epoxidized soybean oil. The resinous polymodal copolymer products can be blended with other polymers. When less transparency is desired or transparency is not necessary, the copolymers can be blended with high impact polystyrene or polyolefins and/or olefin copolymers.

According to the features described above, document D1) is novelty destroying for the subject matter claimed in claims 1-13.

In view of what is known from D1, no inventive effort is considered to be required in order to realize the application's block copolymer mixture containing a branched block copolymer excellent in transparency and impact resistance and useful as a block copolymer mixture by itself or as blended with another thermoplastic resin. Accordingly, the subject matter according to claims 1-13 are not considered to involve an inventive step.

Documents D2)-D6) cited in the search report relating to producing various block copolymer compositions represent the state of the art.

Industrial applicability

The subject matter claimed in claims 1-13 is considered susceptible of industrial application.